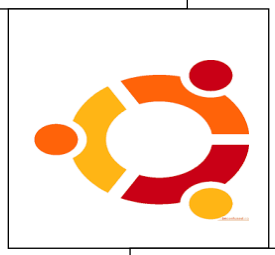
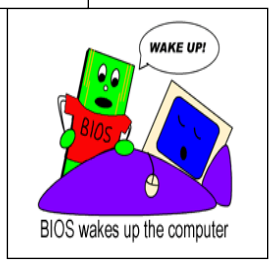
IT-ITeS

NSQF Level 1 – Class IX

ITBO103-NQ2014 - Computer Operating Systems - I

Student's Workbook





BIOS wakes up the computer

प.सु.श.केन्द्रीय व्यावसायिक शिक्षा संस्थान,श्यामला हिल्स, भोपाल

PSS Central Institute of Vocational Education, Shyamla Hills, Bhopal

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Preface

The National Curriculum Framework, 2005, recommends that children's life at school must be linked to their life outside the school. This principle makes a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home, community, and the workplace.

The student workbook on **"Computer Operating Systems - I"** is a part of the qualification package developed for the implementation of National Vocational Education Qualification Framework (NVEQF), an initiative of Ministry of Human Resource Development (MHRD), Government of India to set common principles and guidelines for a nationally recognized qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, Colleges and Universities. It is envisaged that the NVEQF will promote transparency of qualifications, cross-sectoral learning, and student-centred learning and facilitate learner's mobility between different qualifications, thus encouraging lifelong learning.

This student workbook, which forms a part of vocational qualification package for students who have passed Class VIII or equivalent examination, was created by a group of experts. The IT-ITeS Sector Skill Council approved by the National Skill Development Corporation (NSDC) for the IT-ITeS Industry developed the corresponding National Occupational Standards (NOS) and the Qualification Pack (QP). The National Occupational Standards are a set of competency standards and guidelines endorsed by the representatives of IT-ITeS Industry for recognizing and assessing skills and knowledge needed to perform effectively in the workplace.

The Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), a constituent of National Council of Educational Research and Training (NCERT) in association with M/S Technable Solutions Pvt. Ltd., Kolkata has developed modular curricula and learning materials (Units) for the vocational qualification package in IT-ITeS sector for NVEQ levels 1 to 4; level 1 is equivalent to Class IX. Based on NOS, occupation related core competencies (knowledge, skills, and abilities) were identified for development of curricula and learning modules (Units).

This student workbook attempts to discourage rote learning and to bring about necessary flexibility in offering of courses, necessary for breaking the sharp boundaries between different subject areas. The workbook attempts to enhance this endeavor by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups and activities requiring hands-on-experience. We hope these measures will take us significantly further in the direction of a child-centered system of education outlined in the National Policy of Education (1986).

The success of this effort depends on the steps that school Principals and Teachers will take to encourage children to reflect their own learning and to pursue imaginative and on-the-job activities and questions. Participation of learners in skill development exercises and inculcation of values and creativity is possible if we involve children as participants in learning, and not as receiver of information. These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table would be a necessity to maintain the rigour in implementing the activities and the required number of teaching days will have to be increased for teaching and training.

About Your Workbook

This workbook is to assist you with completing the Unit of Competency **Computer Operating Systems-I.** You should work through the workbook in the classroom, at the workplace or in your own time under the guidance and supervision of your teacher or trainer. This workbook contains sessions which will help you to acquire relevant knowledge and skills (soft and hard) on various aspects of the unit of competency. Each session is small enough to be easily tackled and digested by you before you move on to the next session. Animated pictures and photographs have been included to bring about visual appeal and to make the text lively and interactive for you. You can also try to create your own illustrations using your imagination or taking the help of your teacher. Let us now see what the sections in the sessions have for you.

Section 1: Introduction

This section introduces you to the topic of the Unit. It also tells you what you will learn through the various sessions covered in the Unit.

Section 2: Relevant Knowledge

This section provides you with the relevant information on the topic(s) covered in the session. The knowledge developed through this section will enable you to perform certain activities. You should read through the information to develop an understanding on the various aspects of the topic before you complete the exercise(s).

Section 3: Exercise

Each session has exercises, which you should complete on time. You will perform the activities in the classroom, at home or at the workplace. The activities included in this section will help you to develop necessary knowledge, skills, and attitude that you need for becoming competent in performing the tasks at workplace. The activities should be done under the supervision of your teacher or trainer who will guide you in completing the tasks and also provide feedback to you for improving your performance. To achieve this, prepare a timetable in consultation with your teacher or trainer and strictly adhere to the stipulated norms or standards. Do not hesitate to ask your teacher or trainer to explain anything that you do not understand.

Section 4: Assessment

The review questions included in this section will help you to check your progress. You must be able to answer all the questions before you proceed to the next session.

Introduction

Operating System

The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers.

It accumulates programme that can manage the other computer hardware and gives basic services to the computer programs. The operating system is a vital segment of the computer software system. Any kind of application programme also needs the operating system to function.

Time-sharing OS also do the task for a scheduled efficient system and may likewise incorporate accounting software for expense distribution of processor time, printing, mass storage and different assets.

For functions of hardware, for example, input and output and memory assignment, the OS act as a mediator between the software and the hardware. OS might be found on very nearly any gadget that holds a computer from phones and feature diversion reassures to supercomputers and web servers.

Samples of popular OS are Android, iOS, BSD, Linux, OS X, QNX, Microsoft Windows, etc.

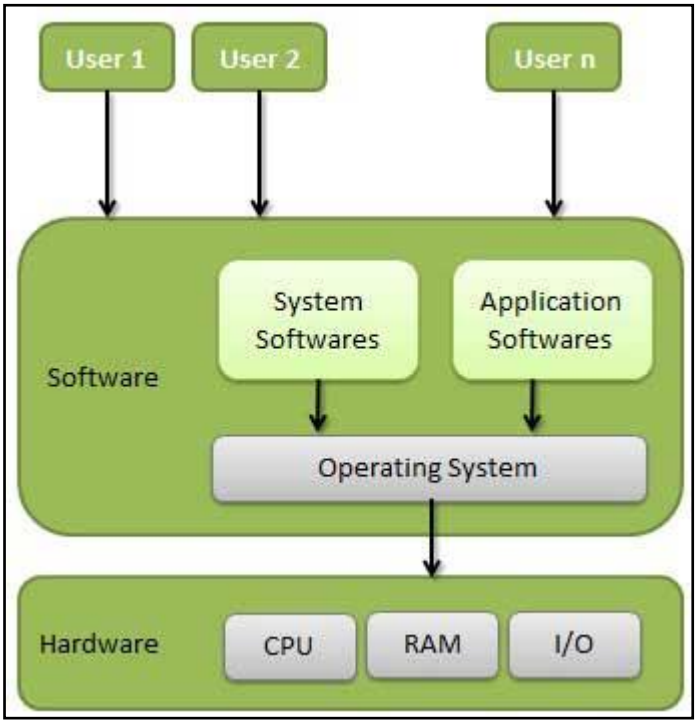
Session 1: Understanding Operating System

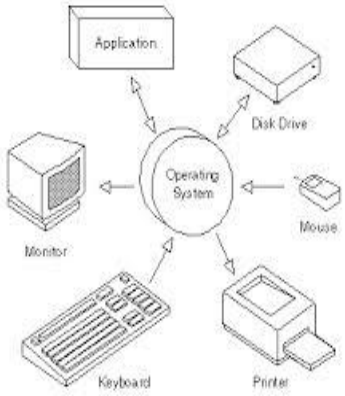
In this session you will learn about the functions of Operating Systems. You will also study about the types of Operating Systems used in desktop/laptop computers and mobile handsets.

Relevant Knowledge

The operating system is one of the most important components of any computer system.

An operating System (OS) is an intermediary between users and computer hardware. It provides users an environment in which a user can execute programs conveniently and efficiently. In technical terms, It is software which manages hardware. An operating System controls the allocation of resources and services such as memory, processors, devices and information.





This is the system that runs the computer at its most basic level. Without an operating system, a computer is a lifeless box.
Operating systems are responsible for everything from starting up the computer when you push the "on" button to high level system security. The type of operating system a computer has also determines what types of software can be run on it.

The Operating System's Job

Following are some of important functions of an operating System.

- Memory Management
- Processor Management
- Device Management
- File Management
- Security
- Control over system performance

- Job accounting
- Error detecting aids
- Coordination between other software and users

You've probably heard the phrase boot your computer, but do you know what that means? Booting is the process that occurs when you press the power button to turn your computer on. During this process (which may take a minute or two), the computer does several things:

- It runs tests to make sure everything is working correctly.
- It checks for new hardware.
- It then starts up the operating system.

Once the operating system has started up, it manages all of the software and hardware on the computer. Most of the time, there are many different programs running at the same time, and they all need to access your computer's central processing unit (CPU), memory, and storage. The operating system coordinates all of this to make sure each program gets what it needs. Without the operating system, the software wouldn't even be able to talk to the hardware, and the computer would be useless. In the image below, you can see how Windows 7 appears after starting up.

Types of Operating System

Operating systems keep evolving over the period of time. Following are few of the important types of operating system which are most commonly used.

- **Batch Operating System:** The users of batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator.
- **Time-sharing Operating Systems:** Time sharing is a

technique which enables many people, located at various terminals to use a particular computer system at the same time.

- **Distributed Operating System:** Distributed systems use multiple central processors to serve multiple real time applications and multiple users. Data processing jobs are distributed among the processors accordingly to which one can perform each job most efficiently.
- **Network Operating System:** Network Operating System runs on a server and provides server the capability to manage data, users, groups, security, applications, and other networking functions. The primary purpose of the network operating system is to allow shared file and printer access among multiple computers in a network, typically a local area network (LAN), a private network or to other networks. Examples of network operating systems are Microsoft Windows Server 2003, Microsoft Windows Server 2008, UNIX, Linux, Mac OS X, Novell NetWare, and BSD.

  Real Time Operating System: Real time system is defines as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. Real time processing is always on line whereas on line system need not be real time. The time taken by the system to respond to an input and display of required updated information is termed as response time. So in this method response time is very less as compared to the online processing.

Operating Systems in Trend

Operating systems usually come preloaded on any computer you buy. Most people use the operating system that comes with their computer, but it is possible to upgrade or even change operating systems.

The three most common operating systems for personal computers are Microsoft Windows, Mac OS X, and Linux.

Modern operating systems use a Graphical User Interface, or GUI (pronounced "gooey"). A GUI lets you use your mouse to click on icons, buttons, and menus, and everything is clearly displayed on the screen using a combination of graphics and text.

Each operating system's GUI has a different look and feel, so if you switch to a different operating system it may seem unfamiliar at first. However, modern operating systems are designed to be easy to use, and most of the basic principles are the same.

In the images below, you can see the Windows, Linux and Mac OS X GUIs.

Windows GUI

Mac OS X GUI

Linux GUI

Before GUIs, computers had a command-line interface, which meant the user had to type every single command, and the computer would only display text.

Microsoft Windows OS

Microsoft created the Windows operating system in the mid-1980s. Over the years, there have been many different versions of Windows, but the most recent ones are Windows 8 (released in 2012), Windows 7 (2009), and Windows Vista (2007). Windows comes preloaded on most new PCs, which helps to make it the most popular operating system in the world.
If you're buying a new computer or upgrading to a newer version of Windows, you can choose from several different editions of Windows, such as Home Premium, Professional, and Ultimate. You may need to do some research to decide which edition is right for you.

Apple Mac OS X
Mac OS is a line of operating systems created by Apple Inc. It comes preloaded on all new Macintosh computers, or Macs. All of the recent versions are known as OS X (pronounced O-S Ten), and the specific versions include Yosemite (released in 2014), Mavericks (2013), Mountain Lion (2012), Lion (2011), and Snow Leopard (2009). Apple also offers a version called Mac OS X Server, which is designed to be run on servers.

Mac OS was developed by Apple Inc. for their Macintosh line of computer systems. Mac OS is a series of graphical user interface-

based operating systems. The original version was the integral and unnamed system software first introduced in 1984 with the original Macintosh, and referred to simply as the "System" software. The System was renamed to Mac OS in 1996 with version 7.6. The System is credited with popularizing the graphical user interface concept. Major revision 10, from 2001 to present, is branded Mac OS X (Now only referred to as OS X).

Linux OS

Linux (pronounced LINN-ux) is a family of open-source operating systems, which means they can be modified and distributed by anyone around the world. This is different from proprietary software like Windows, which can only be modified by the company that owns it (Microsoft). The advantages of Linux are that it is free, and there are many different distributions (or versions) you can choose from. Each distribution has a different look and feel, and the most popular ones include Ubuntu, Mint, and Fedora.
Linux is named after Linus Torvalds, who created the Linux kernel in 1991. The kernel is the computer code that is the central part of an operating system.
Linux was initially developed as a free operating system for Intel x86-based personal computers. Since then it has since been ported to more computer hardware platforms than any other operating system. It is a leading operating system on servers and other systems such as mainframe computers and supercomputers.

Linux also runs on embedded systems, which are devices whose operating system is typically built into the firmware and is highly tailored to the system; this includes mobile phones, tablet computers, network routers, facility automation controls, televisions and video game consoles. Widely used operating system for mobile devices is Android. Android is built on top of the Linux kernel.

The development of Linux is one of the most prominent examples of free and open source software collaboration.

Operating Systems for Mobile Devices
The operating systems we've been talking about were designed to run on desktop or laptop computers. Mobile devices such as phones, tablet computers, and mp3 players are different from desktop and laptop computers, so they run operating systems that are designed specifically for mobile devices. Examples of mobile operating systems include Apple iOS, Windows Phone, and Google Android.
Operating systems for mobile devices generally aren't as fully featured as those made for desktop or laptop computers, and they aren't able to run all of the same software. However, one can still do a lot of things with them, like watch movies, browse the Web, manage your calendar, and play games.

Android OS GUI

Exercise

Collect the information about the current market tends of the latest operating systems and fill the table given below:

Operating System	Manufacturing Organization	Latest Version
Windows		
Macintosh		
Linux		
Android		
iOS		

Assessment

I. Short Answer Questions:

1. Explain unique feature of each Windows, Linux, Mac and Android OS.

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2. Explain meaning of Graphical User Interface (GUI).

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3. Explain functions of Operating Systems.

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Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for assessment activity:

Part – A

Differentiated between the following:

1. Windows and Linux OS
2. MS DOS and MS Windows

Part – B

Discussed in class the following:

1. Functions of operating system
2. Types of operating system
3. Latest versions of operating system
4. Operating system used in mobile handsets

Part - C

Performance Standards

The performance standards may include, but not limited to:

Performance criteria	Yes	No
Demonstrate the knowledge of functions and types of operating system		
Demonstrate the knowledge of latest versions of operating systems used in computers and mobile handsets		

Session 2: Features of Windows 2007 Operating System

In this session you will learn about the historical, surface and advanced features of Windows 2007 Operating System.

Relevant Knowledge

Microsoft's versions of Windows operating systems are mostly used in the world. The original Windows operating system dates back to 1981. Subsequent versions have included Windows 2.0, Windows 3.1, Windows 95, Windows 98, Windows NT, Windows 2000, Windows XP and Windows Vista. The most recent, most advanced, and most feature-rich version of the operating system is Windows 10.

Historical Features

MS-DOS was the earliest consumer operating system that gained Microsoft worldwide attention. In the beginning, Windows was regarded primarily as a graphical user interface (GUI) that did little more than provide an easier and more visually pleasing way to use MS-DOS. What eventually made Windows a standout operating system was its ability to do what its name implies--allow a computer user to have more than one program or process operating simultaneously in various 'windows' on the computer screen.

Advancements

As Windows matured, Microsoft added advances to make the user experience more enjoyable and the development of software for the operating system easier. Windows 2.0 was the first to feature Control Panel, a tool that allowed the user to navigate a graphical interface to adjust settings on the computer. Subsequent advancements included peer-to-peer networking support, Internet support and dial-up networking capabilities. Software became "plug and play," which allowed users to insert diskettes (and eventually CD-ROM discs) into their computer and install software more easily, something that was still at the time difficult on other operating systems.

Surface Features

At this stage you need to be aware of the surface features Windows 7, released in 2009, is Microsoft's most recent iteration of the Windows operating systems. On the surface, it features full 64-bit support, remote media streaming, and touchscreen functionality (when paired with a touchscreen monitor). It also features a new tool call Jump Lists, which makes accessing your most used media and programs easier. The desktop features Snap, a new way to organize order and size the windows on your desktop so that they are easier to read and compare.

Advanced Features

Taking an indication from Apple's OS X operating system, Windows 7 features 'Sleep' and 'Resume' functionality. The search system

has been made quicker and easier to navigate. Memory usage has also been optimized to ensure faster and more reliable performance. Windows 7 has also been redesigned for better power management through the reduction of background activities, less power.

Aero Features: Windows 7 uses a group of features called Windows Aero. Aero is a visual desktop experience that combines translucent windows, appealing color, and graphics effects with convenient functionality. Aero includes Snap, Peek, Shake, and Flip.

Some user friendly features of Windows 7 OS are as follows:

1) **Windows Easy Transfer:** One of the first things you might want to do is to transfer your files and settings from your old computer to the brand new computer. You can do this using an Easy Transfer Cable, CDs or DVDs, a USB flash drive, a network folder, or an external hard disk.

You can transfer almost everything from your old computer to the new one. User accounts, Files and Folders, Program Settings, Internet Settings and Favorites, E-mail settings, contacts and messages.

2) **Windows Anytime Upgrade:** This feature of Windows Operating System allows you to upgrade to any higher windows version available for your system, so you can take full advantage of enhanced digital entertainment and other features.

Windows anytime upgrade helps you compare features in each Windows edition and walks you through the upgrade process. (Windows 10 being the latest Operating system currently available for the entire user worldwide). The upgrade will cost you as per the version being selected by you.

3) **Windows Basics:** If you are new to Windows or want to refresh your knowledge about areas such as security or working with digital pictures, this feature will help you to get started.

Here you can learn how to help keep your computer more secure, work with digital pictures, use the mouse and keyboard, work with files and programs, use email, connect to and explore the internet and many more.

A new user can even see video or animations that will explain the working of the windows operating system and will show you step by step instructions in order to configure your pc according to your desires.

4) Searching and Organizing: Most folders in Windows have a search box in the upper- right corner. To find a file in a folder,

type a part of the file name in the search box.

You can also use this feature when you don't know where a file is actually located or when you want to do an advanced search. Since its will be an indexed searching the results will be very quick and very close to your search entries.

5) Parental Controls: Parental Controls give you the means to decide when your children use the computer, which website they visit, and which games they are allowed to play. You can also get reports of your children's computer activity as well.

6) Ease of Access Center: Ease of Access Center is the place to find and change settings that can enhance how you hear, see and use your computer. You can adjust text size and the speed of your mouse. This is also where you can go to set up your screen reader and find other helpful tools.

7) Default Programs: This is a feature of your Windows Operating System where you can adjust and set your default programs, associate a file type or a protocol with a program, change and set auto play settings, set program access and computer defaults. Very useful to configure our programs according to your wish and requirements.

8) Remote Desktop Connection: This feature helps a user with a graphical user interface to another computer. It is a proprietary protocol developed by Microsoft especially for Windows Operating System. Basically by entering the IP address of the other computer you can directly see that computer's desktop right on to your desktop. Normally known as desktop sharing. Using this you can share files and data and even solve problem without having physical access to the other computer.

Exercise

Perform following activities on Windows 2007 OS:

- Administer Login
- Password changes
- User interface
- Aero Peek
- Aero Snap
- Aero themes
- Windows sidebar and gadgets
- Use library
- Navigate home page
- Organize files and folders
- Create shortcuts
- Use snipping tools
- Manage accounts
- Use help options.

Assessment

Write a short note on following:

1. Historical features of Windows:
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2. Surface features of Windows 7 OS:
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3. Advance features of Windows 7 OS:
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Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for assessment activity:

Part – A
Differentiated between the following:

1. Surface and Advance feature of Windows OS
2. Aero Peek and Aero Snap

Part – B
Discussed in class the following:

1. Features of Windows 2007 OS
2. Aero Features

Part - C
Performance Standards
The performance standards may include, but not limited to:

Performance criteria	Yes	No
Use features of Windows 2007 Operating System		

Session 3: Installing the Windows Desktop Operating System

In this session you will learn about the installation procedure of Windows 2007 OS. You will also study about the system requirements for installing Windows 2007 OS.

Relevant Knowledge

Installing Windows might sound like a frightening and daunting task but it is really quite easy, especially if you're installing a operating system like Windows 7 or Windows 8.

It's especially easy to install Windows with a little help. There is 'No need' to take your PC in to the local experts for a simple install. You can install Windows all by yourself.

Read the guidelines given on the User Manual of CD of Window OS.

You may also take help from www.microsoft.com. Click on the Windows operating system you're planning to install for a helpful comparison on the different Windows installation methods and links to visual, step-by-step guides explaining how to install Windows.

The very best way to install Windows 7 is by a method called a 'clean install.' A Windows 7 clean install simply means an installation of Windows 7 on an unused partition on your hard drive. In most cases, though, a clean install of Windows 7 means to remove an existing operating system (Windows XP, Linux, Windows 7, Windows 8, ... doesn't matter) and to replace it with a fresh installation of Windows 7.

To install Windows 7 using the Clean option and formatting the hard disk:

- Turn on your computer so that Windows starts normally, insert the Windows 7 installation disc or USB flash drive, and then shut down your computer.
- Restart your computer.
- Press any key when prompted, and then follow the instructions that appear.

Product Key

You can find your product key on your computer or inside the Windows package—or in a confirmation e-mail if you purchased and downloaded Windows 7 online. Go to the Microsoft website to see examples of product key stickers.

If you can't find your product key, you might need to buy a new one. To learn how, see Get a new Windows 7 product key. If you receive an error indicating that your product key is not valid when installing Windows 7, see Windows 7 activation error: invalid product key.

Windows 7 System Requirements

Courtesy: http://windows.microsoft.com/en-IN/windows7/products/system-requirements

If you want to run Windows 7 on your PC, here's what it takes:

- 1 gigahertz (GHz) or faster 32-bit (x86) or **64-bit (x64)** processor
- 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- DirectX 9 graphics device with WDDM 1.0 or higher driver

Product functionality and graphics may vary based on your system configuration. Some features may require advanced or additional hardware.

PCs with multi-core processors: Windows 7 was designed to work with today's multi-core processors. All 32-bit versions of Windows 7 can support up to 32 processor cores, while 64-bit versions can support up to 256 processor cores.

PCs with multiple processors (CPUs): Commercial servers, workstations, and other high-end PCs may have more than one physical processor. Windows 7 Professional, Enterprise, and Ultimate allow for two physical processors, providing the best performance on these computers. Windows 7 Starter, Home Basic, and Home Premium will recognize only one physical processor.

Exercise

1. Draw a flowchart of the Windows 2007 installation process.
2. Install Windows 2007 operating system in desktop computer.

Assessment

Short Answer Questions

1. Describe the meaning of Clean Install.

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2. Explain the significance of Product Key in OS installation.

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3. Enlist the system requirements for installing Windows 2007 OS.

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Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for assessment activity:

Part – A

Differentiated between the following:

1. Product Key and Activation Key
2. Installation and Commissioning

Part – B

Discussed in class the following:

1. Installation procedure of Windows 2007 OS
2. System requirements for Windows 2007 OS installation

Part - C

Performance Standards

The performance standards may include, but not limited to:

Performance criteria	Yes	No
Install Windows 2007 operating system in computer		
Demonstrate the knowledge of system requirements for installing Windows 2007 OS in computer		

Session 4: Features of Linux Desktop Operating System

In this session you will learn about Components and Basic Features of Linux OS. You will also study about Linux system architecture, Kernel mode and User mode and advantages and disadvantages of Linux. Some Linux commands are also discussed in this session.

Relevant Knowledge

Linux is one of popular version of UNIX operating System. It is open source as its source code is freely available. It is free to use. Linux was designed considering UNIX compatibility. Its functionality list is quite similar to that of UNIX.

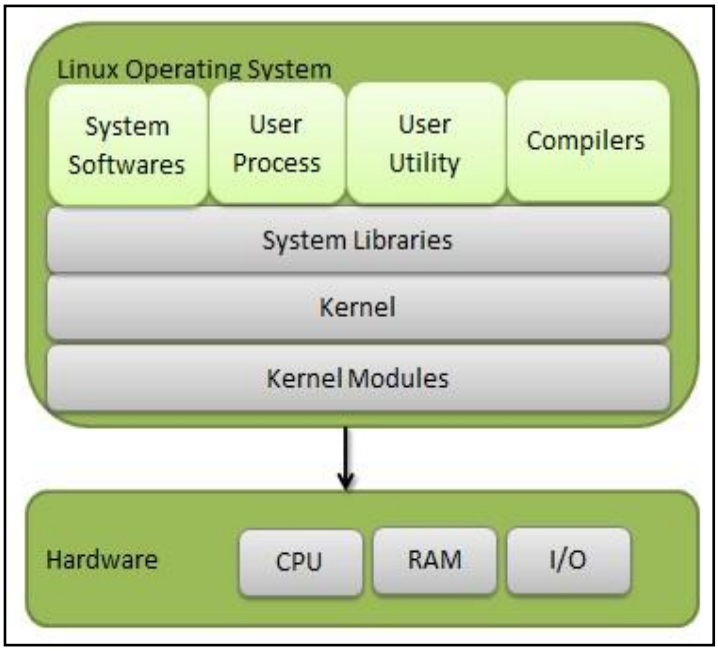
Components of Linux OS

Linux Operating System has primarily three components: Kernel, System Library, System Utility

1) **Kernel** - Kernel is the core part of Linux. It is responsible for all major activities of this operating system. It is consists of various modules and it interacts directly with the underlying hardware. Kernel provides the required abstraction to hide low level hardware details to system or application programs.

2) **System Library** - System libraries are special functions or programs using which application programs or system utilities accesses Kernel's features. These libraries implements most of the functionalities of the operating system and do not requires kernel module's code access rights.

3) **System Utility** - System Utility programs are responsible to do specialized, individual level tasks.



Kernel Mode vs. User Mode

Kernel component code executes in a special privileged mode

called kernel mode with full access to all resources of the computer. This code represents a single process, executes in single address space and do not require any context switch and hence is very efficient and fast. Kernel runs the processes and provides system services to processes, provides protected access to hardware to processes.

Support code remains in the System Library and is not required to run in kernel mode is in System Library.

User programs and other system programs works in User Mode which has no access to system hardware and kernel code. User programs/ utilities use System libraries to access Kernel functions to get system's low level tasks.

Basic Features of Linux OS

Some of the important features of Linux Operating System are:

- **Portable** - Portability means software can works on different types of hardware in same way. Linux kernel and application programs support their installation on any kind of hardware platform.

- **Open Source** - Linux source code is freely available and it is community based development project. Multiple teams work in collaboration to enhance the capability of Linux operating system and it is continuously evolving.

- **Multi-User** - Linux is a multiuser system means multiple users can access system resources like memory/ RAM/ application programs at same time.

- **Multiprogramming** - Linux is a multiprogramming system means multiple applications can run at same time.

- **Hierarchical File System** - Linux provides a standard file structure in which system files/ user files are arranged.

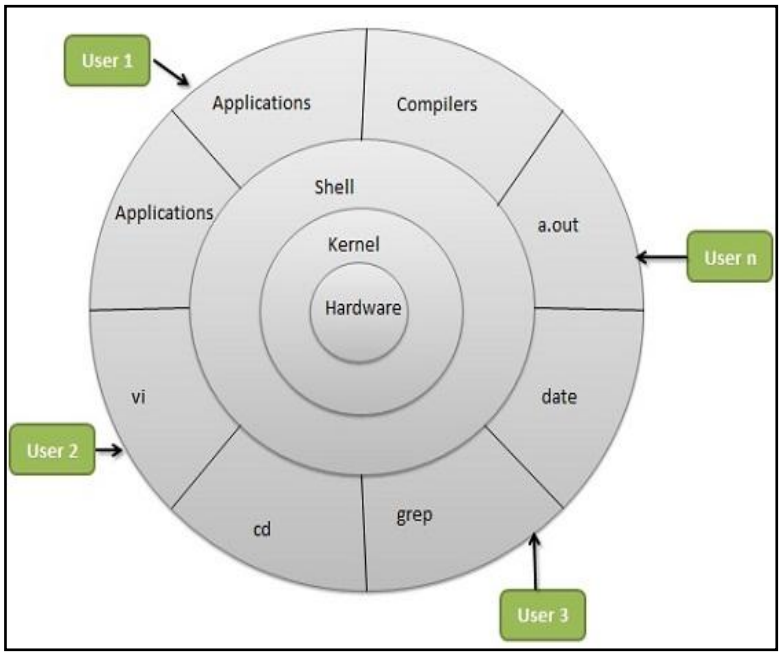
- **Shell** - Linux provides a special interpreter program which can be used to execute commands of the operating system. It can be used to do various types of operations, call application programs etc.

- **Security** - Linux provides user security using authentication features like password protection/ controlled access to specific files/ encryption of data.

Linux System Architecture

Linux System Architecture consists of following layers:

- **Hardware layer** - Hardware consists of all peripheral devices (RAM/ HDD/ CPU etc).
- **Kernel** - Core component of Operating System, interacts directly with hardware, provides low level services to upper layer components.
- **Shell** - An interface to kernel, hiding complexity of kernel's functions from users. Takes commands from user and executes kernel's functions.
- **Utilities** - Utility programs giving user most of the functionalities of an operating systems.



Advantages of Linux:

1. Cost - The most obvious advantage of using Linux is the fact that it is free to obtain, while Microsoft products are available for a hefty and sometimes recurring fee. Microsoft licenses typically are only allowed to be installed on a single computer, whereas a Linux distribution can be installed on any number of computers, without paying a single dime.

2. Security - In line with the costs, the security aspect of Linux is much stronger than that of Windows.

3. Choice (Freedom) - The power of choice is a great Linux advantage. With Linux, you have the power to control just about every aspect of the operating system. Two major features you have control of are your desktops look and feel by way of

numerous Window Managers, and the kernel.

4. Software - There are so many software choices when it comes to doing any specific task. Software on Linux tends to be packed with more features and greater usability than software on Windows. Best of all, the vast majority of Linux software is free and open source.

5. Hardware - Linux is perfect for those old computers with barely any processing power or memory you have sitting in your garage or basement collecting dust. Install Linux and use it as a firewall, a file server, or a backup server. There are endless possibilities. Old 386 or 486 computers with barely any RAM run Linux without any issue.

6. Flexibility - Linux offers more flexibility in designing and usage than windows OS.

7. Easy to install applications - Installing new programs in Linux is easier than in Windows. You don't need to accept agreements because it is all open source so there is no need to click Next 20 times before the program is installed.

Disadvantages of Linux:

1. Understanding - Becoming familiar with the Linux operating system requires patience as well as a strong learning curve.

2. Compatibility – Because of its free nature, Linux is sometimes behind the curve when it comes to brand new hardware compatibility. Though the kernel contributors and maintainers work hard at keeping the kernel up to date, Linux does not have as much of a corporate backing as alternative operating systems. Sometimes you can find third party applications, sometimes you can't.

3. Alternative Programs - Though Linux developers have done a great job at creating alternatives to popular Windows applications, there are still some applications that exist on Windows that have no equivalent Linux application.

Using Linux Commands

Mkdir - mkdir vibhor will create new directory, i.e. here vibhor directory is created.

Find - Find command is a extremely useful command. You can search for any file anywhere using this command provided that file and directory you are searching has read write attributes set to you, your, group or all. Find descends directory tree beginning at each pathname and finds the files that meet the specified conditions.

Ls - ls command is most widely used command and it displays the contents of directory.

Cd - cd sandeep will change directory from current directory to sandeep directory.

Pwd - pwd command will print your home directory on screen, pwd means print working directory.

Cp - cp command copies a file. If I want to copy a file named oldfile in a current directory to a file named newfile in a current directory.

Mv - mv command is used to move a file from one directory to another directory or to rename a file.

Rm - To delete files use rm command.

Grep - grep command is the most useful search command. You can use it to find processes running on system, to find a pattern in a file, etc.

Sort - sort command sort the lines of a file or files, in alphabetical order.

Exercise

1. Draw the Linux System Architecture and try to analyze the structural design.
2. Perform following actions on Linux OS:

    - Using a menu
    - Read and virtual file
    - File permission system
    - Viewing and altering permission using the mount command
    - Mounting a drive manually, removing a mounted system
    - File searching using 'find'
    - 'locate' and 'whereis' command
    - Commands for changing directory
    - Basic file handling

3. Use following commands on Linux OS:

    - **Mkdir**
    - **Find**
    - **Ls**
    - **Cd**
    - **Pwd**
    - **Cp**
    - **Mv**

- **Rm**
- **Grep**
- **Sort**

Assessment

I. Short Answer Questions:

1. Describe the components of Linux OS.

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2. Explain basic features of Linux OS.

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3. State advantages and disadvantages of Linux OS.

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Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for assessment activity:

Part – A

Differentiated between the following:

1. Kernel Mode and User Mode
2. System Library and Kernel Module
3. System Library and System Utility
4. Kernel and Shell

Part – B

Discussed in class the following:

1. Components of Linux OS
2. Basic Features of Linux OS
3. Linux System Architecture
4. Advantages and Disadvantages of Linux

Part – C

Performance Standards
The performance standards may include, but not limited to:

Performance criteria	**Yes**	**No**
Demonstrate the knowledge of components and basic features of Linux OS		
Describe the Linux system architecture		
Explain advantages and disadvantages of Linux		
Use few Linux OS commands		

Session 5: Installing the Linux Desktop Operating System

In this session you will learn about the installation procedure of Linux OS. You will also study about the system requirements for installing Linux OS.

Relevant Knowledge

Document does not provide comprehensive instructions for installing a Linux operating system, but this section provides guidelines for the tasks involved in the OS installation and the installation methods available.

System requirements for installing Ubuntu (Linux) Desktop Edition

(Courtesy: https://help.ubuntu.com/community/Installation/SystemRequirements)

1. 700 MHz processor (about Intel Celeron or better)
2. 512 MB RAM (system memory)
3. 5 GB of hard-drive space (or USB stick, memory card or external drive but see Live CD for an alternative approach)
4. VGA capable of 1024x768 screen resolution
5. Either a CD/DVD drive or a USB port for the installer media
6. Internet access is helpful

Operating System Installation Overview

The following procedures are required for installing drivers if you are performing a fresh installation of a Linux operating system. You do not need to reinstall the drivers if you are using the preinstalled version of the operating system. The task map is important. Refer to the table below.

Operating System Installation Task Map

Task	Installation Task	Instructions
Set up your server.	Install your server hardware and configure the service processor.	Sun Fire X2100 M2 Server Installation Guide (819-6589)
Prepare your system for operating system installation.	If necessary, erase the primary boot disk, set up the BIOS, and set up the LSI RAID configuration if the LSI RAID card is installed.	Chapter1 and Configuring Your System for RAID.
Review the Sun Fire X2100 M2 Server Product Notes.	The product notes contain late-breaking news about the Solaris OS software and patches.	Sun Fire X2100 M2 Server Product Notes (819-6601)
Install the Linux OS.	Choose an installation method and locate the installation instructions.	Operating System Installation Methods

Operating System Installation Task Map		
Task	**Installation Task**	**Instructions**
Install the system-specific drivers from the Tools and Drivers CD.	Install the system-specific drivers needed to run the Linux operating system on the Sun Fire X2100 M2 server.	Installing the System-Specific Drivers
Run the up2date or SUSE Watcher utility.	Patches are available from the SunSolve Patch Portal. For details visit website: www.sunsolve.sun.com	Running the up2date Utility for the RHEL OS or Running the SuSEWatcher Utility for the SLES OS

CONFIGURING YOUR SYSTEM FOR RAID	**Configuring Your System for RAID** If you don't have the LSI Logic SAS3041E-R card installed in your computer system, and you don't plan to install it, you can skip this section. Note - The Sun Fire X2100 M2 Server supported versions of Linux all have the LSI boot driver included in the operating system software. The operating system will automatically recognize the LSI boot drivers. If you have the LSI Logic SAS3041E-R card installed while configuring RAID for the Solaris Operating System follows the procedure below: 1. Install the optional LSI Logic SAS3041E-R card (Sun part number SG-PCIE4SAS-Z). See the *Sun Fire X2100 M2 Server Service Manual* for instructions on installing and cabling the card. 2. Power on the server. 3. During the boot process, press Ctrl-C to enter the LSI utility when the LSI SAS card is recognized. **4. Create your RAID.** See the LSI Integrated RAID User's Guide at: http://www.lsilogic.com/files/docs/techdocs/storage_stand_prod/ PCISCSICont/Software/ir_ug.pdf **5. Save your work and exit the utility.** **6. Install the Linux Operating System.** See Operating System Installation Methods. **7. Download the LSI utilities for managing RAID from the following site:** lsi.com/storage_home/products_home/host_bus_adapters/sas_hb

	as/lsisas3041er/index.html
OPERATING SYSTEM INSTALLATION METHODS	**Operating System Installation Methods** See the following list of installation methods to determine the type of installation that you want to do and the information source for the installation. See Choosing an Operating System Installation Method for a description of each method. The following methods can be used: • Direct Installation Using DVD or CD-ROM Media • Network Installation Using PXE • Remote KVMS over IP With Virtual CD-ROM • Serial Redirection
DIRECT INSTALLATION USING DVD OR CD-ROM MEDIA	**Direct Installation Using DVD or CD-ROM Media** See the instructions for basic installation in the document that corresponds to the operating system you are installing.

Exercise

1. Draw a flowchart of the Linux OS installation process.
2. Install Linux operating system in desktop computer.

Assessment

I. Short Answer Questions:

1) Describe Operating System Installation Task Map.

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2) Enlist the system requirements for installing Linux OS.

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Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for assessment activity:

Part – A

Differentiated between the following:

1. Linux Operating System Installation and Windows Operating System Installation

Part – B

Discussed in class the following:

1. Linux operating system installation procedure
2. System requirements for installing Linux OS

Part - C

Performance Standards

The performance standards may include, but not limited to:

Performance criteria	Yes	No
Install Linux operating system in computer		
Demonstrate the knowledge of system requirements for installing Linux OS in computer		

Glossary

Application	An application is a program, or group of programs, that is designed for the end user
Architecture	The way in which the parts of a computer are organized
Booting	Booting is initialization of a computerized system
Commissioning	Bring (something newly produced) into working condition
Compatibility	Able to exist together without trouble or conflict
Configuration	The way a computer system or program is prepared for a particular use
Driver	A piece of computer software that controls a device (such as a mouse or printer) that is attached to the computer
Encryption	To change (information) from one form to another especially to hide its meaning
Graphics	Relating to the pictorial arts
Installation	The act or process of making a machine, a service, etc., ready to be used in a certain place
Interface	An area or system through which one machine is connected to another machine
Processor	It is a logic circuitry that responds to and processes the basic instructions that drive a computer
Proprietary	One that possesses, owns, or holds exclusive right to something
Response time	Response time is the time a system or functional unit takes to react to a given input
Server	The main computer in a network which provides files and services that are used by the other computers
Touchscreen	A type of screen on a computer which shows options that you can choose by touching the screen
Upgrade	An occurrence in which one thing is replaced by something better, newer, more valuable, etc.

Suggested Reading

BOOKS

- Operating System: by I.A.Dhotre
- Linux kernel internals: by Michael Beck
- Linux Device Drivers: by Alessandro Rubini, Jonathan Corbet

WEBSITES

- http://www.gcflearnfree.org/computerbasics/
- http://www.tutorialspoint.com/operating_system/os_quick_guide.htm/
- http://www.nsdcindia.org/
- http://www.nassconm.in/
- http://www.webopedia.com/TERM/O/operating_system.html